

CLAIMS

1. A process for preparing ethylene polymers carried out in the presence of a catalyst system comprising (i) a solid catalyst component comprising Mg, Ti, halogen, and optionally an internal electron donor compound, and (ii) an Al-alkyl compound said process comprising at least two step of polymerization (a) and (b), in which:
 - in a first step (a) ethylene is polymerized in the presence of a molecular weight regulator in order to produce an ethylene (co)polymer; and
 - in a further step (b), which is carried out in the presence of an external electron donor compound added to this polymerization step as a fresh reactant, ethylene is copolymerized with an alpha olefin of formula $\text{CH}_2=\text{CHR}$, in which R is a C1-C20 hydrocarbon group, to produce an ethylene copolymer having a molecular weight higher than that of the (co)polymer produced in step (a).
2. The process according to claim 1 in which the solid catalyst component (i) comprises a Ti compound and a magnesium dihalide.
3. The process according to claim 2 in which the solid catalyst component (i) further comprises an electron donor compound (ID) selected from alcohol, glycols, esters, ketones, amines, amides, nitriles, alkoxysilanes and ethers.
4. The process according to claim 3 in which the electron donor compound (ID) is tetrahydrofuran or ethylacetate.
5. The process according to claim 1 in which the outside electron donor compound (OD) added to the polymerization step (b) as a fresh reactant is THF.
6. The process according to claim 1 which is carried out in gas-phase.
7. The process of claim 6 in which the polymerization step (a) and (b) are carried out in two fluidized bed reactors.
8. The process of claim 6 in which the polymerization step (a) is out in a fluidized bed reactor, and the step (b) is carried out in a gas-phase reactor having two interconnected polymerization zones.
9. The process according to claim 1 in which the polymerization step (a) is carried out in the presence of hydrogen.
10. The process according to claim 1 in which the comonomer used in polymerization step (b) is selected from 1-butene, 1-pentene, 1-hexene, 4-methyl-1-pentene, 1-heptene and 1-octene.

11. The process according to claim 1 in which the alkyl-Al compound (ii) is selected from the trialkyl aluminum compounds.
12. The process according to claim 11 in which the trialkyl aluminum compound is used in mixture with alkylaluminum halides.
13. The process according to claim 1 in which the components (i), (ii), and optionally the (OD) compound are pre-contacted before being introduced into the reactor, for a period of time ranging from 0.1 to 120 minutes at a temperature ranging from 0 to 90°C.
14. The process according the claim 1 in which in the polymerization step (a) is produced an ethylene polymer having a density not less than 0.955 kg/dm³ and in the copolymerization step (b) the copolymer produced has an average molecular weight ranging from 100000 to 1.000.000 g/mol.